NEEDLE ARRANGEMENT

Field of the Invention / Background

The invention relates to a needle arrangement for an injection device.

A needle arrangement of this kind is known from EP 0 749 758 A1, Hjertmann et al. In it, a hollow needle that is mounted on a hollow needle holder is used. The latter is screwed onto an external thread at the proximal end of the injection device. A special apparatus which makes the hollow needle invisible to the user, so as to eliminate his or her anxiety regarding injections, is then slid over this hollow needle.

Summary of the Invention

It is the object of the invention to make available a new needle arrangement for an injection device.

According to the invention, this object is achieved by ~~the subject matter of Claim 1~~.

A needle arrangement of this kind is very easy to utilize, since in practice it uses nothing more than a replaceable hollow needle. Easy adjustment of the penetration depth is also achieved, since the necessary penetration depth may be different depending on the patient's constitution. In this instance, it can be adjusted easily and obviously.

Another manner of achieving the stated object is ~~evident from the subject matter of Claim 18~~.

An arrangement of this kind has only a few parts and thus can be produced very economically. It can be used by the patient in a simple, easily understandable fashion.

A further manner of achieving the stated object is ~~evident from the subject matter of Claim 30~~.

A needle arrangement of this kind can very easily be kept sterile until used. The covering cap is usable as an assembly aid, additionally facilitating use by the patient.

Each time the patient thrusts the hollow needle in prior to an

NEEDLE ARRANGEMENT

The invention relates to a needle arrangement for an injection device.

A needle arrangement of this kind is known from EP 0 749 758 A1 *or from DE-U1-8 909 799.8.* In it, a hollow needle that is mounted on a hollow needle holder is used. The latter is screwed onto an external thread at the proximal end of the injection device. A special apparatus which makes the hollow needle invisible to the user, so as to eliminate his or her anxiety regarding injections, is then slid over this hollow needle.

It is the object of the invention to make available a new needle arrangement for an injection device.

According to the invention, this object is achieved by the subject matter of Claim 1.

A needle arrangement of this kind is very easy to utilize, since in practice it uses nothing more than a replaceable hollow needle. Easy adjustment of the penetration depth is also achieved, since the necessary penetration depth may be different depending on the patient's constitution. [In this instance, it can be adjusted easily and obviously.] *Its adjustment is possible, in a simple manner, by adjustment of the stop element which cooperates with the distal end segment of the first cap.*

Another manner of achieving the stated object is evident from the subject matter of Claim [18] *9.* [An arrangement of this kind has only a few parts and thus can be produced very economically. It can be used by the patient in a simple, easily understandable fashion.

A further manner of achieving the stated object is evident from the subject matter of Claim 30.]

A needle arrangement of this kind can very easily be kept sterile until used. The covering cap is usable as an assembly aid, additionally facilitating use by the patient. *It is preferable to provide the removable closure element as a peelable foil, because that makes its use very simple and understandable.*

A further manner of achieving the stated object is evident from the subject matter of claim 23. This represents an additional safety feature, since if the cap has fallen off or, due to improper handling, has been removed, the needle is still surrounded by the integrally formed plastic spring/needle carrier structure, which represents some protection, albeit reduced, against injury or contamination from the needle, analogous to a cage surrounding the needle. This cage is not relied upon in the normal case, but rather represents a "second line of defense."

Each time the patient thrusts the hollow needle in, prior to an

injection, the displaceable cap is displaced in the distal direction against the force of the spring, and when the hollow needle is pulled out it moves back into its proximal end position under the action of the spring, so that the patient does not see the hollow needle during the entire injection procedure. Because of the detachable mounting on the injection device, a needle arrangement of this kind can very easily be replaced, after an injection, with a new, sterile needle arrangement.

Brief Figure Description

Further details and advantageous developments of the invention are evident from the exemplary embodiment, which is described below and depicted in the drawings and is in no way to be understood as a limitation of the invention, and from the dependent claims. In the drawings:

FIG. 1 is a longitudinal section through a preferred embodiment of a needle arrangement according to the present invention, in an exploded and greatly magnified depiction;

FIG. 2 shows a view similar to that of FIG. 1 but in the assembled state, the hollow needle being concealed by the arrangement;

FIG. 3 shows a view similar to that of FIG. 2 but with the needle thrust in, the penetration depth being labeled D;

FIG. 4 shows a view similar to that of FIG. 2, additionally depicting an outer covering cap 66 which serves to encase the needle arrangement in sterile fashion;

FIG. 5 shows a view of a complete, packaged needle arrangement according to a preferred embodiment of the invention;

FIG. 6 is a plan view looking in the direction of arrow VI of FIG. 5;

FIG. 7 is a view showing the adjustment of the penetration depth by way of the external covering cap 66;

FIG. 8 is a sectional view along line A-A of FIG. 7;

FIG. 9 is a sectional view along line B-B of FIG. 7; and

FIG. 10 is a sectional view through a defined breakpoint for a stop element, viewed along line C-C of FIG. 7.

Detailed Description

In the description that follows, the terms "proximal" and "distal" will be used in the manner usual in medicine, to wit:

"proximal" = facing toward the patient (the end of the injection device having the needle);

"distal" = facing away from the patient.

FIG. 1 shows, on the left, a hollow needle carrier 10 made of a suitable plastic, e.g. polyethylene. Secured in this is a hollow needle (injection needle) 12 whose distal end 14 serves to pierce through the rubber membrane (not depicted) on the reservoir of an injection device 16 that is indicated only schematically in FIGS. 2 and 3.

An inner thread 20 of hollow needle 10, which is delimited in the proximal direction by a shoulder 22 serving as a stop, provides detachable mounting on an external thread 18 at the proximal end of injection device 16.

The proximal segment of hollow needle 12 is labeled 24. Extending concentrically around it, in the arrangement as shown in FIG. 1, is a plastic spring 26 that can be configured integrally with hollow needle carrier 10 and that here comprises two helical springs or spirals 26a, 26b, offset 180°, which each transition at their proximal end into a ring 28 with which they can also be integrally configured. Alternatively a separate spring, for example made of metal, could also be used here.

A first sleeve or cap 32 has a substantially cylindrical segment 34 whose cylindrical outer side is labeled 33 and whose cylindrical inner side 35 is configured for sliding displacement on the (also cylindrical)

circumference 36 of hollow needle carrier 10. First cap 32 furthermore has at its proximal end a base 40 in whose center is located a recess 42 through which proximal end 24 of hollow needle 12 can pass during an injection, as shown in FIG. 3.

First cap 32 has on its inner side 35 a total of three longitudinal grooves 44, only two of which are visible in FIG. 1, uniformly distributed on the circumference and providing axial guidance, i.e. rotation prevention. They coact with three projections 45, complementary thereto, on the cylindrical outer circumference 36 of hollow needle carrier 10, as clearly shown by FIGS. 2 and 3.

First cap 32 furthermore has three barbs 46 on its inner circumference 35. These barbs are also uniformly distributed on the circumference, and coact with three corresponding complementary barbs 48 on outer circumference 36 of hollow needle 10, only one of which is visible in FIG. 1. During assembly, barbs 46 slide over barbs 48 so that parts 10 and 32 are joined to one another nondetachably but axially displaceably; barbs 46, 48 form a stop in the proximal direction, as depicted in FIG. 2, and grooves 44 coact with the complementary projections 45 to provide rotation prevention for first cap 32, so that the latter cannot rotate relative to hollow needle carrier 10.

As clearly shown in FIGS. 1 through 3, there is located on outer circumference 36 of hollow needle carrier 10 a stop arrangement 50 against whose proximal shoulder 52 (as shown in FIG. 3) first cap 32 comes to rest with its distal end 53 when hollow needle 12 is thrust with its proximal end 24 into a body part 54 (indicated only schematically).

Stop arrangement 50 has here a distal stop element 56, a central stop element 58, and a proximal stop element 60. At least proximal stop element 60 and central stop element 58 are each joined integrally to hollow needle carrier 10 by way of a defined break point 76 (FIG. 10), and consequently can be broken off from hollow needle carrier 10 by the user. This increases insertion depth D (FIG. 3) of the proximal hollow needle portion 24. Thus either it is possible to break off only stop element 60, so that first cap

32 then comes to rest against a shoulder 61 when hollow needle 12 is thrust in; or both stop elements 58 and 60 can be broken off, in which case first cap 32 then comes to rest against a shoulder 62 when hollow needle 12 is thrust in. In the latter case, the maximum penetration depth is attained.

FIG. 4 shows, at left, hollow needle carrier 10 on whose circumference stop elements 56, 58, 60 and 56, 58', 60, 56", etc. are arranged at uniform spacings of 120°. FIG. 6 shows the three stop elements 56, 56', and 56" in a plan view according to arrow VI of FIG. 5.

FIG. 4 shows that an outer covering cap 66, which provides sterile covering of the needle arrangement, is also provided. Outer covering cap 66 is depicted in FIG. 4 partially in longitudinal section, and it is evident that its cylindrical inner recess 68, which in the case of the complete needle arrangement shown in FIGS. 5 and 6 is slid over the cylindrical outer side 33 of first cap 32, has three longitudinal grooves 70 which are distributed uniformly on the circumference of inner recess 68 and are dimensioned such that they can be slid over stop elements 56, 58, 60, 56', 58', 60', 56" etc., as is particularly clearly evident from FIG. 6.

FIG. 5 also shows a protective film 71 with which, in the complete needle arrangement, the opening (FIG. 5, left) of outer covering cap 66 can be sealed in sterile fashion. This film is welded on or adhesively bonded on, and is torn off before use. Film 71 is not depicted in FIG. 6.

FIG. 7 shows how outer covering cap 66 can be slid axially onto first cap 32 in the direction of arrow 72, arriving at a position 66' which is indicated in FIG. 7 with dot-dash lines and is depicted in section in FIG. 8, and in which its longitudinal grooves 70 are in engagement with stop elements 60, 60', 60". If outer covering cap 66 is then rotated in the direction of rotation arrow 74 depicted in FIG. 7, stop elements 60, 60', 60" are broken off along their defined break points 76 (cf. FIG. 10), i.e. penetration depth D (FIG. 3) is correspondingly increased in the manner already described above. In the same manner, it is also possible to break

off both stop elements 58, 60 (correspondingly 58', 60', etc.), and thereby to increase penetration depth D even further.

What is described is thus a needle arrangement for an injection device 16. It has a hollow needle carrier 10 on which a hollow needle 12 is mounted and which is configured for detachable mounting on injection device 16. The arrangement has a cap 32 that is arranged on hollow needle carrier 10 displaceably approximately parallel to the longitudinal extension of hollow needle 12, is equipped at its proximal end segment with a passthrough opening 42 for hollow needle 12, and in its proximal end position substantially conceals hollow needle 12. A compression spring 26 is arranged between hollow needle carrier 10 and cap 32 in order to displace cap 32 into its proximal end position. Also provided is a covering cap 66 which surrounds the displaceable cap 32, hollow needle 12, and hollow needle carrier 10, and on its open side is sealed in sterile fashion by a tear-off sealing member 71. A needle arrangement of this kind can easily be replaced after an injection. It improves compliance because the patient does not at any time see hollow needle 12. The compression spring can be configured as plastic spring 26. It is preferably integral with hollow needle carrier 10, which simplifies manufacture.

Many other variants and modifications are, of course, also possible within the scope of the present invention.

7